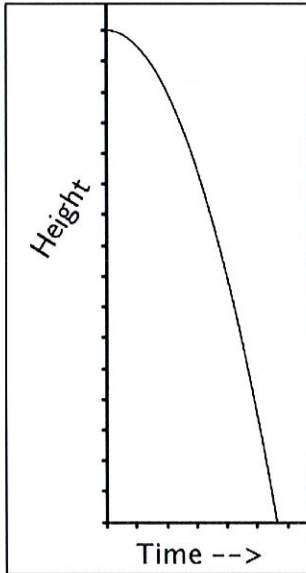


Name: _____

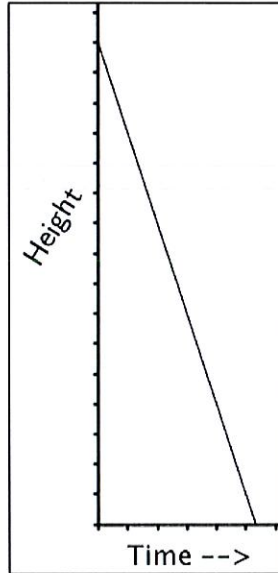
Date: _____

An object is dropped from a given height. Which graph below would represent the height of the object over time? Why? Explain **in words** why you chose the graph you chose.

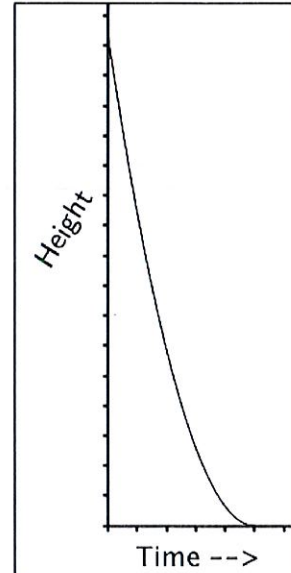
Graph 1



Graph 2



Graph 3

**CHARACTERISTICS OF PARABOLAS:**

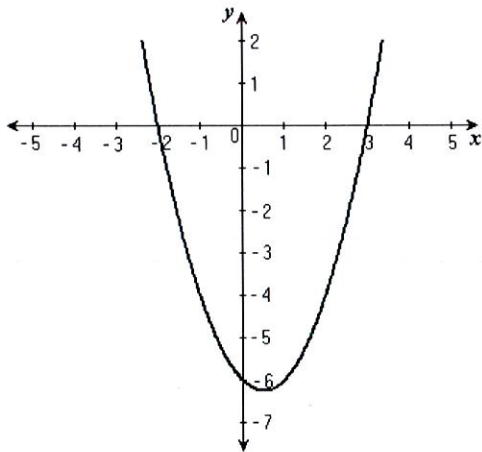
Before we dissect the graph of a parabola, we need to make some things clear:

- A **parabola** is the graph of a **quadratic** function.
- A **parabola** can be described in a function in three different ways:
 - **Standard form:** $f(x) = ax^2 + bx + c$;
 - **Vertex form:** $f(x) = a(x - h)^2 + k$; and
 - **Factored form:** $f(x) = a(x - r_1)(x - r_2)$

All parabolas have common characteristics.

PART 1. What do you notice? What do you wonder?

Parabola #1

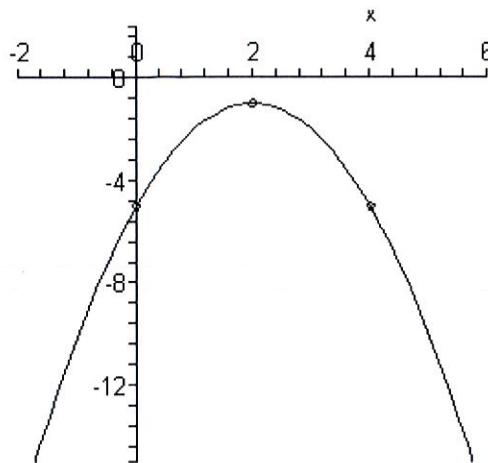


Does this graph have a y-intercept?
Any x-intercept(s)? Where?

y-intercept: _____ (as a point)
point)

x-intercept(s): _____ (as a point)

Parabola #2



Does this graph have a y-intercept?
Any x-intercept(s)? Where?

y-intercept: _____ (as a

x-intercept(s): _____ (as a point)

Compare/contrast parabola #1 with parabola #2. What do they have in common? What's different about them?

Come up with at least 4 comparisons.

1.

3.

2.

4.

Additional comparisons:

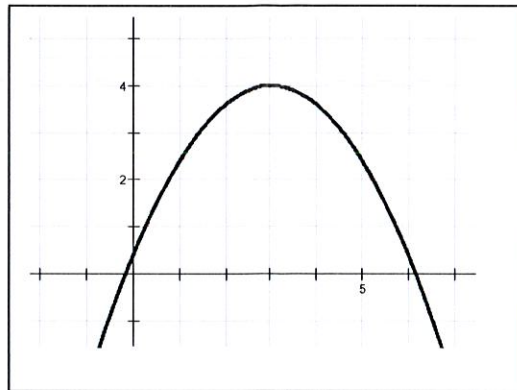
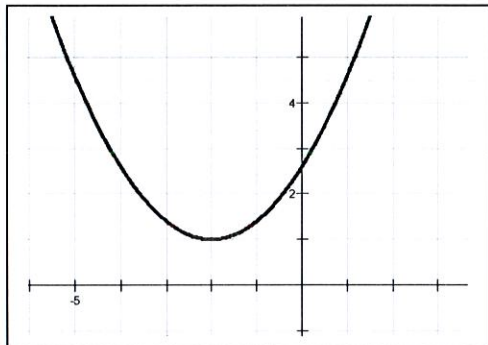
(c) Based on what you observed with both parabolas, what do you wonder about them and their graphs? What questions do you have about quadratic functions?

PART 2. Parabola parts

Let's get specific.

CHARACTERISTIC #1: All parabolas increase AND decrease.

Show where these parabolas increase and decrease:



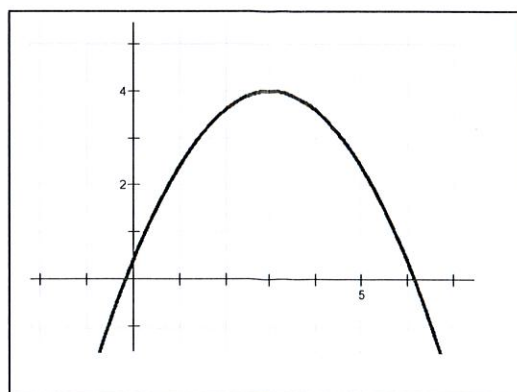
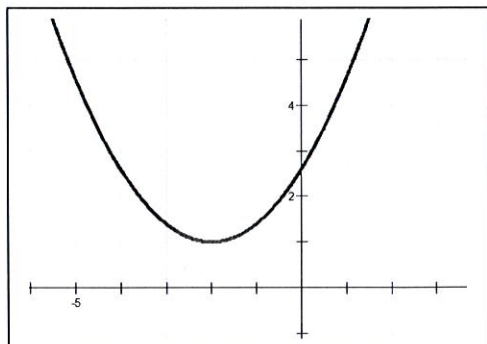
CHARACTERISTIC #2: All parabolas have a vertex.

The vertex is also known as the _____ because it's where the graph

—.

When the parabola opens UP, the vertex shows the highest y-value that the graph reaches, known as the _____. When the parabola opens DOWN, the vertex shows the lowest y-value of the graph—the _____.

Show all key terms on these graphs:



CHARACTERISTIC #3: All parabolas are symmetrical.

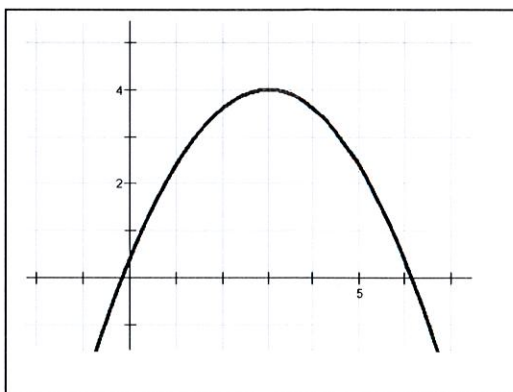
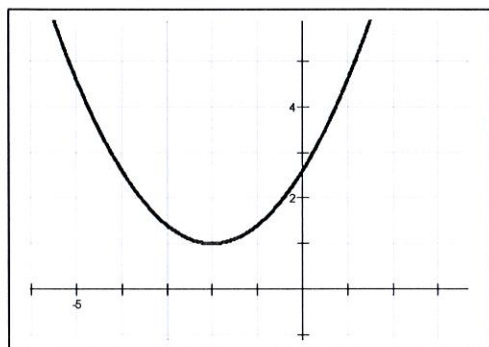
You can cut a parabola in half at its vertex by drawing an “imaginary” vertical line right through it.

The equation of this vertical line of symmetry is $x = (\text{x-value of vertex})$. Its fancier name is the _____.

→ What this means: If a parabola's **vertex** is at $(-4, 5)$, then its **line of symmetry** would be the line $x = -4$.

Also, of the y-values on the left side of the symmetry line are identical to the y-values on the right side of the symmetry line.

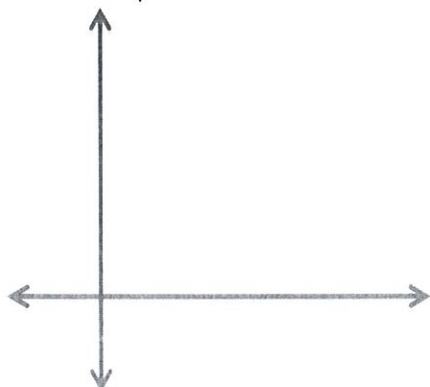
Show the line of symmetry on each of these graphs. Don't forget to write its equation, too.



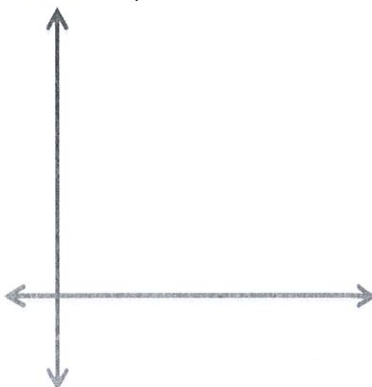
CHARACTERISTIC #4: All parabolas have 1 y-intercept and 0, 1, or 2 x-intercepts.

Draw each type of parabola:

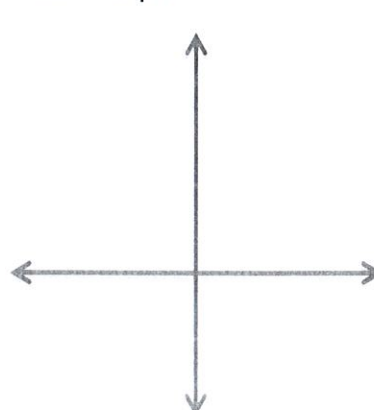
2 x-intercepts



1 x-intercept

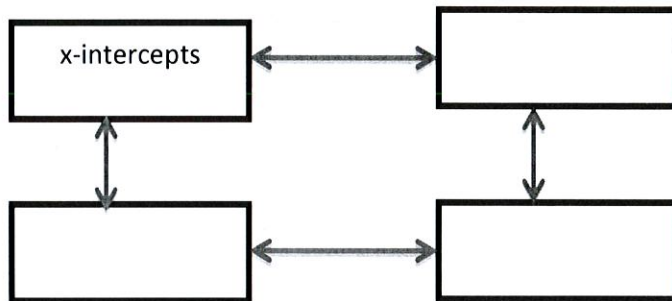


0 x-intercepts



CHARACTERISTIC #4: All parabolas have 1 y-intercept and 0, 1, or 2 x-intercepts.
[CONTINUED]

There are other names for the x-intercepts.



CHARACTERISTIC #5: The range of a quadratic function depends on its vertex.

The domain of any quadratic function is all numbers.

Why does its range depend on the vertex?

CHARACTERISTIC #6: You can express a parabola's equation in different forms.

Standard form: _____

Vertex form: _____

Factored form: _____

Terms to Know:

- vertex
- concavity
- y-intercept
- x-intercept(s)
- min/max
- range

Identify the characteristics (see the list above) of each parabola:

PARABOLA CHARACTERISTICS

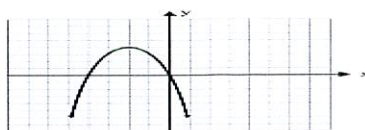
Identify the characteristics of each parabola.

1.



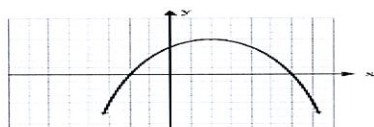
Vertex _____
 Min/Max _____
 Domain _____
 Range _____
 Zeros _____

2.



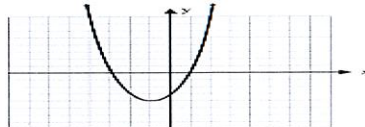
Vertex _____
 Min/Max _____
 Domain _____
 Range _____
 Zeros _____

3.



Vertex _____
 Min/Max _____
 Domain _____
 Range _____
 Zeros _____

4.

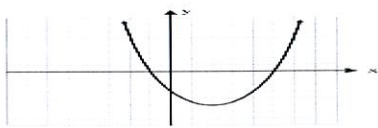


Vertex _____
 Min/Max _____
 Domain _____
 Range _____
 Zeros _____

PARABOLA CHARACTERISTICS

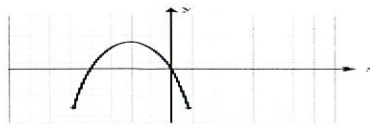
Identify the characteristics of each parabola.

1.



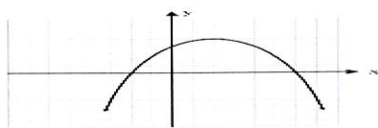
Vertex _____
 Min/Max _____
 Domain _____
 Range _____
 Zeros _____

2.



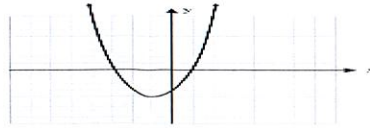
Vertex _____
 Min/Max _____
 Domain _____
 Range _____
 Zeros _____

3.



Vertex _____
 Min/Max _____
 Domain _____
 Range _____
 Zeros _____

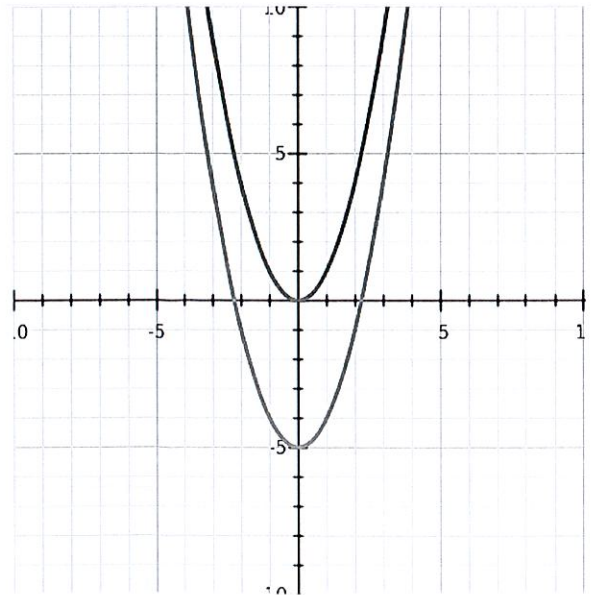
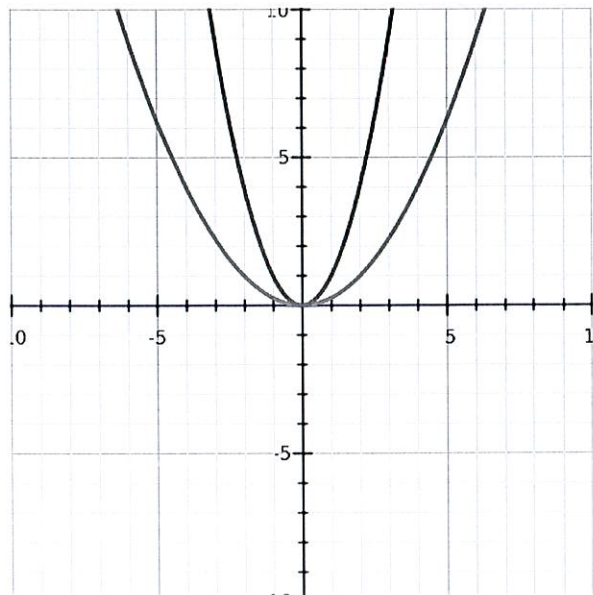
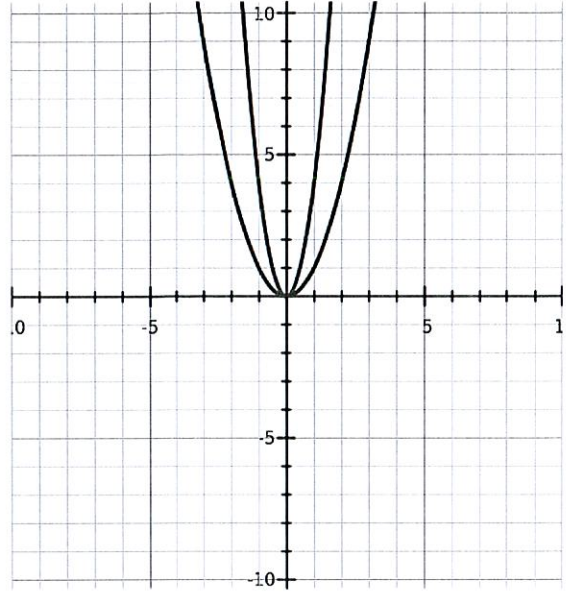
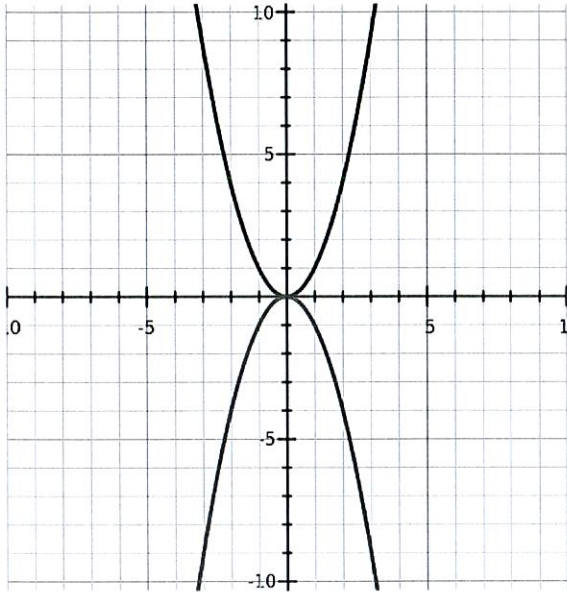
4.



Vertex _____
 Min/Max _____
 Domain _____
 Range _____
 Zeros _____

Algebra 2
Quadratics Day 2: Characteristics of Parabolas

Compare and contrast the two functions on each graph. The parent function, $f(x) = x^2$ is in red in each of the graphs. The transformed function is in blue. Identify which parts of the parabola changed from the red to the blue function.



Algebra 2
Quadratics Day 2: Characteristics of Parabolas

